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International Specialists in the Environment

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July 20, 1990

Carl G. Kitz
Environmental Protection Agency
1200 Sixth Avenue, HW-113
Seattle, WA 98101

Ref: TDD T10-9005-010

Dear Carl:

Enclosed please find a brief summary of the removal options for the Soda Springs, Idaho Radiation Site. This information was compiled at the request of Catherine Krueger.

Sincerely,

Wm L Carberry

William L. Carberry
Acting TAT Leader

DRS/thl

Enclosure

cc: Catherine Krueger, EPA
Mark Masarik, EPA IOO
Dan Phalan, EPA
Cindy Mackey, EPA
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REMOVAL OPTIONS for

SODA SPRINGS, IDAHO RADIATION SITE

TDD T10-9005-010

1.0 INTRODUCTION

Ecology and Environment, Inc. (E & E) is the designated Technical Assistance Team (TAT) contractor to the U.S. Environmental Protection Agency (EPA). The EPA Region X Superfund Response and Investigations Section (SRIS) has tasked E & E to conduct radiation surveys of private homes in the Soda Springs, Idaho, area. E & E will document the site conditions at the homes, and based upon the action levels promulgated by the EPA, will assist the EPA in determining the need for removal actions.

This document outlines the options which E & E has identified for reducing gamma radiation exposure and radon exposure in private homes.

2.0 REMOVAL OPTIONS

The purpose of remedial actions in the Soda Springs area is two-fold:

1) To reduce the public's exposure to gamma radiation either by removing contaminated material from the properties or by modifying existing structures to attenuate gamma radiation sources.

2) To reduce the public's exposure to elevated levels of radon gas in homes through the implementation of radon-reduction techniques, including sealing, ventilation, sub-slab suction, and others.

2.1 Gamma Radiation Remediation

Several alternatives have been identified for cleaning up identified homes. These include:

1) No action

2) Modification of existing structures to isolate radiation sources from inhabitants. This alternative would provide a short-term means of reducing gamma exposure to residents. It involves the use of shielding installed in homes to absorb gamma radiation emanating from slag-containing walls. Because the attenuation of gamma radiation is an exponential function, gamma radiation can only be

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reduced in intensity by increasingly thicker absorbers; it cannot be completely absorbed. Thus, the degree of shielding required is dependent upon the relative reduction in intensity which is desired. Table 1 shows the relative reduction in intensity achieved by lead and concrete shielding for the gamma radiation emitted by the major radioactive constituents in phosphate slag.

TABLE 1

GAMMA RADIATION ATTENUATION FROM LEAD AND CONCRETE SHIELDING

Percent Attenuation	t-lead (inches)	t-concrete (inches)
50%	0.71	4
70%	1.0	6
90%	1.6	10
95%	2.3	13
99%	3.1	20

t = thickness

The degree of shielding required in a particular home must be determined based on the intensity of the gamma radiation in that home and the level of radiation above the natural background levels which is considered acceptable, (shielding will not reduce gamma levels to below background levels). The background level in the Soda Springs area is estimated at 12 μR/h (Peterson 1979).

The installation of lead shielding was employed as a temporary measure to reduce gamma exposure in a limited number of private residences at the Montclair, NJ Radium Site. This action was eventually followed by the removal of the radioactive construction material and fill around the homes. No costs are presently available for the shielding program.

3) Removal of the identified residual radioactive material and restoration with clean materials. This alternative requires excavation of slag-containing foundations from beneath homes, and re-pouring the foundations. Such action would provide a permanent remediation and eliminate public health concerns.

This option has been employed at a number of Uranium Mill Tailings Remedial Action (UMTRA) and Formerly Utilized Site Remedial Action Program (FUSRAP) sites, including Montclair, NJ, Monticello,

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UT, Grand Junction, CO, and Lowman, ID.

The average cost of removal for the 91 properties at the Monticello, UT site was $65,000 per property (USEPA 1989b). This figure represents a wide range of activities, however, and since no breakdown was available on costs for specific actions (e.g. foundation removal), it is probably not representative of potential costs at Soda Springs.

Cost information from the Montclair, NJ site may be more applicable, since remedial actions at several of the homes involved removal of poured foundation material. To date, three homes at this site have had their entire foundations removed and rebuilt, which involved supporting the house on pilings, excavating down to the foundation, and demolishing and rebuilding the foundation. The process took about three months and cost about $500,000 per home. The assessed valuation of the homes was $150,000 - $175,000 (Johnson 1990).

Costs for removal of radioactive contamination at the Lowman, ID site are being researched. Activities at Lowman included the removal of concrete foundations containing radioactive mill tailings (Moore 1990).

4) <u>Relocation of residents and construction of new housing.</u> This alternative would include destruction and removal of contaminated homes and construction of new homes either on- or off-site. This option would provide a permanent remediation and eliminate public health concerns. EPA Guidelines have been established to allow the use of this option (Liias 1990).

Costs for this alternative would include demolition ($10,000 - $15,000) and construction of a new home with a similar value.

2.2 Radon Remediation Techniques

Numerous methods exist to reduce ambient radon levels in homes. A brief summary of these techniques is shown in Table 2. The selection, design, and implementation of these methods are described in detail by the agency (EPA 1988). Implementation of radon remediation techniques should be orchestrated with any gamma radiation remedial activities.

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TABLE 2

RADON REMEDIATION TECHNIQUES

Method	Installation Cost	Maximum Reduction Possible
Forced Ventilation	< $1000	90%
Heat Recovery Ventilation	$500 - $2500	50% - 75%
Sealing Cracks and Openings	variable	site-specific
Drain-tile Suction	$700 - $1500	99%
Sub-slab Suction	$900 - $2500	99%

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